

## Claims

What is claimed is:

- 1 1. A composition suitable for use as a planarizing underlayer in a multilayer  
2 lithographic process, said composition comprising:  
3 (a) a polymer containing:  
4 (i) cyclic ether moieties,  
5 (ii) saturated polycyclic moieties, and  
6 (iii) aromatic moieties, and  
7 (b) an acid generator.
- 1 2. The composition of claim 1 wherein said cyclic ether moieties are pendant  
2 from acrylate monomers, said monomers forming at least a portion of said  
3 polymer.
- 1 3. The composition of claim 1 wherein said polycyclic moieties are pendant  
2 from acrylate monomers, said monomers forming at least a portion of said  
3 polymer.
- 1 4. The composition of claim 1 wherein said polycyclic moieties are located in  
2 a backbone portion of said polymer.
- 1 5. The composition of claim 1 wherein said aromatic moieties are pendant  
2 from an ethylenic monomer, said monomer forming at least a portion of  
3 said polymer.
- 1 6. The composition of claim 5 wherein said aromatic moieties are selected  
2 from the group consisting of phenyl and phenol.

1 7. The composition of claim 1 wherein said polymer contains acrylate  
2 monomers having both an polycyclic moiety and a cyclic ether moiety  
3 pendant from said monomer.

1 8. The composition of claim 1 wherein said acid generator is a thermally  
2 activated acid generator.

1 9. The composition of claim 1 wherein said acid polymer further comprises  
2 fluorine-containing moieties.

1 10. The composition of claim 1 wherein said composition consists essentially  
2 of components (a) and (b).

1 11. A lithographic structure on a substrate, said structure comprising:  
2 (a) a planarizing underlayer comprising:  
3 a polymer containing:  
4 (i) cyclic ether moieties,  
5 (ii) saturated polycyclic moieties, and  
6 (iii) aromatic moieties, and  
7 an acid generator.  
4 (b) a radiation-sensitive imaging layer over said planarizing underlayer.

1 12. The structure of claim 11 wherein said layers are patterned such that  
2 portions of said substrate are exposed.

1 13. The structure of claim 11 wherein said imaging layer is a silicon-containing  
2 resist.

- 1 14. A method of forming a patterned material feature on a substrate, said  
2 method comprising:
- 3 (a) providing a material layer on a substrate,
- 4 (b) forming a planarizing layer over said material layer, said  
5 planarizing layer being formed by reacting a planarizing underlayer  
6 composition, said underlayer composition comprising  
7 a polymer containing:  
8 (i) cyclic ether moieties,  
9 (ii) saturated polycyclic moieties, and  
10 (iii) aromatic moieties, and  
11 an acid generator,
- 12 (c) forming a radiation-sensitive imaging layer over said planarizing  
13 layer,
- 14 (d) patternwise exposing said imaging layer to radiation thereby  
15 creating a pattern of radiation-exposed regions in said imaging  
16 layer,
- 17 (e) selectively removing portions of said imaging layer and  
18 planarizing layer to expose portions of said material layer, and
- 19 (f) etching said exposed portions of said material layer, thereby  
20 forming said patterned material feature.

- 1 15. The method of claim 14 further comprising:  
2 (g) removing any remaining portions of said imaging layer and said  
3 planarizing layer from material layer.
- 1 16. The method of claim 14 wherein said radiation is ultraviolet radiation  
2 having a wavelength less than 200 nm.
- 1 17. The structure of claim 14 wherein said imaging layer is a silicon-containing  
2 resist.
- 1 18. The method of claim 14 wherein said material layer is selected from the  
2 group consisting of dielectric, metals, and semiconductors.
- 1 19. A composition suitable for use as a planarizing underlayer in a multilayer  
2 lithographic process, said composition comprising:  
3 (a) a polymer containing:  
4 (i) saturated polycyclic moieties, and  
6 (ii) aromatic moieties,  
7 (b) an acid generator, and  
8 (c) a crosslinker.
- 1 20. The composition of claim 19 wherein said polymer further comprises  
2 pendant hydroxyl moieties.